

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

SPACE SHUTTLE MISSION STS-61A

PRESS KIT
AUGUST 1985



SPACELAB D1

STS-61A INSIGNIA

S85-38035 -- This insignia represents the record-sized space shuttle crew of eight. Crewmembers surnames surround the colorful insignia scene depicting Challenger carrying a long science module and an international crew from the United States and Europe (Messerschmid and Furrer from the Federal Republic of Germany and Ockels from Holland).

The NASA insignia design for space shuttle flights is reserved for use by the astronauts and for other official use as the NASA Administrator may authorize. Public availability has been approved only in the form of illustrations by the various news media. When and if there is any change in this policy, which we do not anticipate, it will be publicly announced.

PHOTO CREDIT: NASA or National Aeronautics and Space Administration.

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STS-61-A TO CARRY D-1 – THE FIRST GERMAN SPACELAB

The “Deutschland Spacelab Mission D-1” is the first of a series of dedicated West German missions on the Space Shuttle. It also is the first time a Spacelab payload has come from Europe completely checked out and ready for installation in the orbital laboratory.

Spacelab D-1 is managed by the Federal German Aerospace Research Establishment (DFVLR) for the German Federal Ministry of Research and Technology (BMFT). DFVLR’s responsibilities include provision of the payload, payload analytical and physical integration and verification, and payload operation on orbit.

The Spacelab payload was assembled by MBB/ERNO over a 5-year period at a cost of approximately \$175 million. The company serves as prime contractor to the 12-nation European Space Agency in the \$1 billion Spacelab project.

Used by German and other European universities, research institutes and industrial enterprises, the D-1 is dedicated to experimental scientific and technological research.

Launch of the 22nd Space Shuttle mission is currently planned for no earlier than Oct. 30, 1985. Orbiter Challenger is scheduled to begin its ninth trip into space with a liftoff from Complex 39A, Kennedy Space Center, FL, at 12 noon, EST. The window for that date extends to 3:00 p.m.

Highlights of the 7-day mission include basic and applied microgravity research in the fields of materials sciences, life sciences and technology, and communication and navigation. The users are German and foreign universities, research institutes and industrial enterprises as well as ESA and NASA.

Challenger will carry an 8-member crew – the largest ever flown in space – commanded by Henry (Hank) Hartsfield, who piloted the STS-4 and commanded the STS-41-D flights. Pilot Steven Nagel served as mission specialist aboard STS-51-G.

Other crewmembers include mission specialists James Buchli, Guion Bluford and Bonnie Dunbar; and European payload specialists Drs. Reinhard Furrer (DFVLR - German), Ernst Messerschmid (DFVLR - German) and Wubbo Ockels (ESA- Dutch).

Buchli is a veteran of Shuttle flight 51-C, the first mission totally dedicated to the Department of Defense. Bluford flew aboard STS-8. This will be the first mission for Dunbar, Furrer, Messerschmid and Ockels.

Challenger will be launched into a circular orbit of 201 statute miles and have a 57-degree inclination to the equator.

As with all Space Shuttle missions, NASA will maintain control over the Shuttle vehicle and overall safety and conduct of the flight. For D-1, the Federal Republic of Germany will have management responsibility for the scientific mission to be carried out during the seven-day flight. The payload operations control center will be at the German Space Operations Center (GSOC) located in Oberpfaffenhofen, near Munich.

Payload Elements

The experimental facilities are arranged according to scientific disciplines into so-called Payload Elements. The facilities are provided by DFVLR, ESA and NASA.

These facilities comprise melting furnaces, facilities for the observation of fluid physics phenomena, chambers to provide specific environmental conditions for living test objects, and the Vestibular Sled, which exposes astronauts to defined accelerations to study the function of the inner ear.

The majority of the facilities are housed together with the necessary technical infrastructure in standard Spacelab racks within the Spacelab module.

Module Elements

Werkstofflabor: The WL is designed to be a multipurpose and multi-use facility for materials science and space processing experiments in microgravity. It houses the following hardware: a mirror heating facility, a cryostat, a gradient heating facility, a fluid physics module, an isothermal heating facility and a high-temperature thermostat.

Prozesskammer: The PK (or process chamber) was tailored to the requirements of the scientists. It is designed to show and measure flows, heat and mass transport, and temperature distribution occurring during melting and solidification processes, as well as during phase changes of liquids.

Vestibular Sled: The VGS is an ESA contribution consisting of a seat for a test subject that can be moved backward and forward with precisely adjusted accelerations along rails fixed on the floor of Spacelab's aisle. The seat is driven by an electro-motor and traction rope.

The sled permits tests to investigate the functional organization of man's vestibular and orientation system and the vestibular adaptation processes under microgravity.

The acceleration of the astronauts will be combined with thermal stimulations of the inner ear and optokinetic stimulations of the eye.

MEDEA: The Material science Experiment Double rack for Experiment modules and Apparatus (MEDEA) is composed of three largely autonomous experiment facilities.

Metallurgical and directional solidification experiments will be performed in a gradient furnace. Crystal growth will be carried out in the monoelipsoidal mirror heating facility. The high precision thermostat measures specific heat at the critical point of a specimen.

Biowissenschaften (BW): This life sciences payload experiment package combines a group of three-element botanical or biological and two medical experiments in which a small botanical garden will be tended during the mission. Frog larvae development will be investigated in the "frog statolith" experiment. The third experiment in the field of life sciences continues the first Spacelab's medical experiments of the central venous pressure. For the first time, the internal pressure of the eye will be measured. This experiment is designed to study fluid shifts under the effect of microgravity, as well as the adaptive behavior of the related human organs.

Biorack (BR): The Biorack is a multipurpose ESA research facility that can repeatedly perform biological experiments under weightlessness. Two incubators with different operating temperatures, a freezer and a hermetically sealed glove box are located in a single rack. To provide for the necessary controlled environment, different types of sample containers are provided, some equipped with measurement points that are controlled by the Spacelab computer system. During the ascent and descent phases, the containers with biological material will be stowed and passively temperature controlled in the middeck area to ensure late access to and early retrieval from the orbiter.

NAVEX: The navigation experiments payload element has two main objectives: development and testing of a precise clock synchronization; and testing a method for precise one-way distance measurement and position determination.

Material Experiment Assembly: The MEA is a self-contained facility that provides accommodation for multidiscipline experiments in the materials processing field. MEA was developed for NASA's OSTA-2, and has flown on several missions.

After 7 days and 40 minutes of around-the-clock scientific observations, Challenger will land at Edwards Air Force Base in California on Nov. 6, at approximately 12:40 p.m. EST. Reentry will begin with the firing of the orbiter's orbital maneuvering system engines over the Indian Ocean as Challenger makes its 111th revolution of the Earth.

(END OF GENERAL RELEASE; BACKGROUND INFORMATION FOLLOWS.)

GENERAL INFORMATION

NASA Select Television Transmission

Space Shuttle flight 61-A is dedicated to the German Spacelab mission D-1. Payload and mission specialists in Spacelab will work through the German Science Operations Center (GSOC) in Oberpfaffenhoffen, Germany, near Munich.

Television from the Spacelab will be relayed from the NASA Mission Control Center at Johnson Space Center, Houston, to GSOC. These TV downlinks also will be released in real time on NASA Select television. They will be accompanied by commentary from GSOC, first in German, then in English for the 12 hours, daily, that the GSOC newsroom is active. During the remaining 12 hours, TV downlinks will continue to be released on NASA Select, but without commentary.

The German Aerospace Research Establishment (DFVLR) will provide a printed scene list to U.S. media prior to these downlinks. The NASA commentator periodically will announce that these scene lists are available in the NASA newsrooms. The NASA commentator will not discuss the activities shown on the TV downlink. All questions regarding activities on the TV downlinks will be referred to DFVLR spokespersons.

NASA-Select television coverage of Shuttle mission 61-A will be carried on a full satellite transponder:

Satcom F-2R, Transponder 13, C-Band
Orbital Position: 72 degrees west longitude
Frequency: 3954.5 MHz vertical polarization
Audio Monaural: 6.8 MHz

NASA-Select video also is available at the AT&T Switching Center, Television Operation Control in Washington, DC, and at the following NASA locations:

NASA Headquarters, Washington, DC
Langley Research Center, Hampton, VA
John F. Kennedy Space Center, FL
Marshall Space Flight Center, Huntsville, AL
Dryden Flight Research Facility, Edwards, CA
Ames Research Center, Mountain Valley, CA
Jet Propulsion Laboratory, Pasadena, CA

The schedule for television transmissions from the orbiter and for the change-of-shift briefings from Johnson Space Center, Houston, will be available during the mission at Kennedy Space Center, Fla.; Marshall Space Flight Center, Huntsville, AL; Johnson Space Center; and NASA Headquarters, Washington, DC.

The television schedule will be updated on a daily basis to reflect changes dictated by mission operations. Television schedules also may be obtained by calling COMSTOR (713/280-8711). COMSTOR is a computer data-base service requiring the use of a telephone modem.

Special Note to Broadcasters

Beginning Oct. 23 and continuing throughout the mission, approximately 7 minutes of audio interview material with the crew of 61-A will be available to broadcasters by calling 202/269-6572.

Briefings

Flight control personnel will be on 8-hour shifts. Change-of-shift briefings by the off-going flight director will occur at approximately 8-hour intervals.

Science briefings originating from GSOC twice a day will be available at the NASA news centers in audio only.

61-A BRIEFING SCHEDULE

Time (EST)	Briefing	Origin
T-1 Day		
11:00 a.m.	Spacelab D-1 Mission Overview	KSC
2:30 p.m.	Pre-launch Press Conference	KSC
T-Day		
1:00 p.m. (approximate)	Post Launch Briefing	KSC
Launch Through End-of-Mission		
Times announced on NASA Select Schedules in NASA newsrooms	Flight Director Change-of-Shift Briefings	JSC
	Science Briefings (audio only)	GSOC
Landing Day		
2:00 p.m.	Post Landing Briefing	DFRF

SHUTTLE MISSION 61-A – QUICK LOOK FACTS

Crew:	Henry W. Hartsfield Jr., Commander Steven R. Nagel, Pilot (blue) Bonnie J. Dunbar, Mission Specialist (MS-1, blue) James F. Buchli, Mission Specialist (MS02, red) Guion S. Bluford Jr., Mission Specialist (MS-3, red) Ernst Messerschmid, German Payload Specialist (PS-1, red) Reinhard Furrer, German Payload Specialist (PS02, blue) Wubbo J. Ockels, Dutch Payload Specialist (PS-3, not assigned to team)
Orbiter:	Challenger (OV-099)
Launch Site:	Pad 39A, Kennedy Space Center, FL
Launch Date/Time:	Oct. 30, 1985, 12:00 noon EST
Window:	3 hours
Orbital Inclination:	57.0 degrees
Insertion Orbit:	175 by 175 (n. mi)
Mission Duration:	7 days, 40 minutes (111 orbits, land on 112)
Landing Date/Time:	Nov. 6, 1985, 12:40 p.m. EST
Primary Landing Site:	Edward Air Force Base, CA, Runway 17
Weather Alternative:	Kennedy Space Center, FL
Cargo and Payloads:	Spacelab D-1 long module plus Mission Peculiar Equipment Support Structure Global Low Orbiting Message Relay Satellite (GLOMR)
Experiments and Tests:	Material science Experiment Double rack for Experiment modules and Apparatus (MEDEA) Navigation Experiment (NAVEX) Material Science Double Rack (MSDR) Biorack (BR) Process Chamber (PK) Vestibular Sled (VS) Biowissenschaften (BW) Nosewheel Steering Test
Highlights:	First dedicated Spacelab mission under direction of the German Aerospace Research Establishment (DFVLR); first control of payload from location outside U.S.; first flight of an 8-person crew.

61-A TRAJECTORY SEQUENCE OF EVENTS

Event	Orbit	Tig Met (d:h:m)	Burn Duration Min-sec	Delta v (fps)	Post burn Apogee/perigee (n mi)
Launch		0:00:00			
MECO		0:00:09			
OMS-1		0:00:11	2:07	199	
OMS-2		0:00:45	2:14.5	220	
GLOMR/GS	9A	0:12:32			
Deorbit TIG	111	0:12:32			
Entry Interface		7:00:10			
Landing at Edwards Runway 17	112A	7:00:40			

SUMMARY OF MAJOR ACTIVITIES

Flight Day 1

Ascent

- SRB ignition
- Pitchover
- Max dynamic pressure
- SRB separation
- Main engine cutoff
- External tank sep

On-Orbit

- Payload bay doors open
- RMS checkout
- Activate Spacelab experiments
- GLOMR deploy
- Payload operations

Flight Day 2 through Flight Day 6

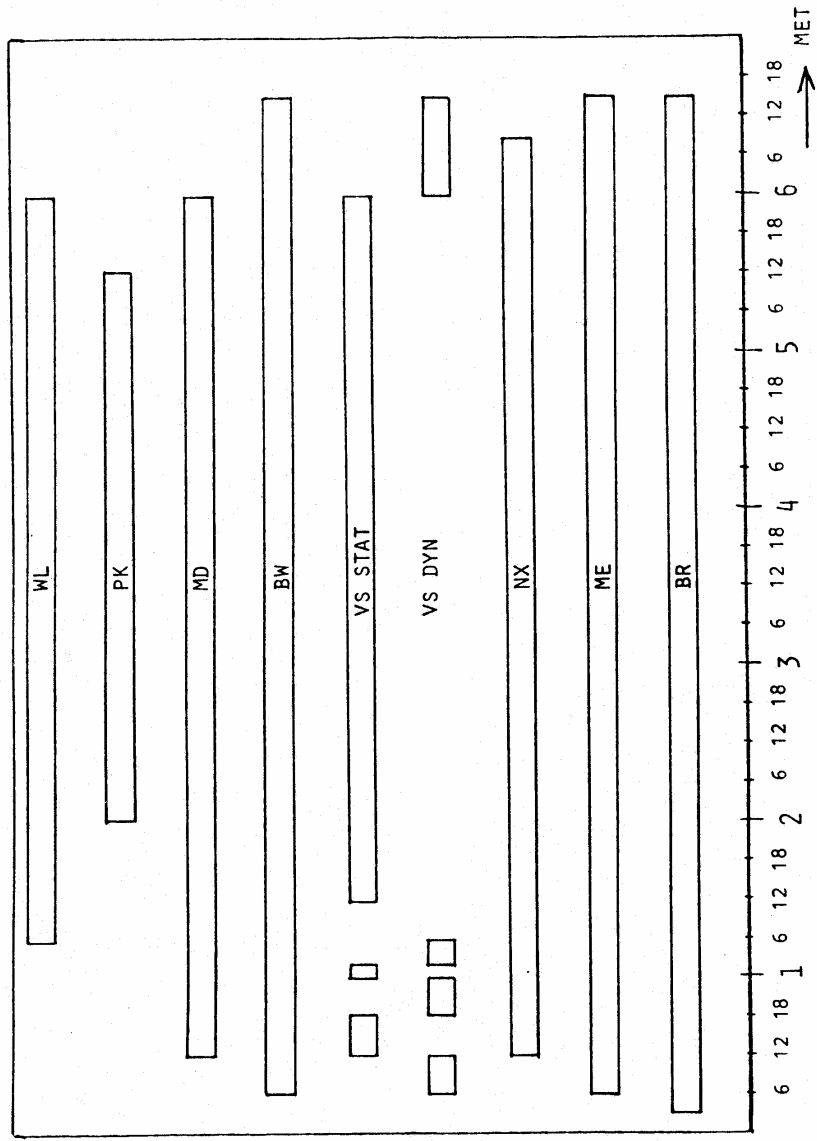
Payload operations (see Payload Elements Operations Schedule, next page)

Flight Day 7

- Payload operations
- FCS checkout
- RCS hot fire
- Cabin stow

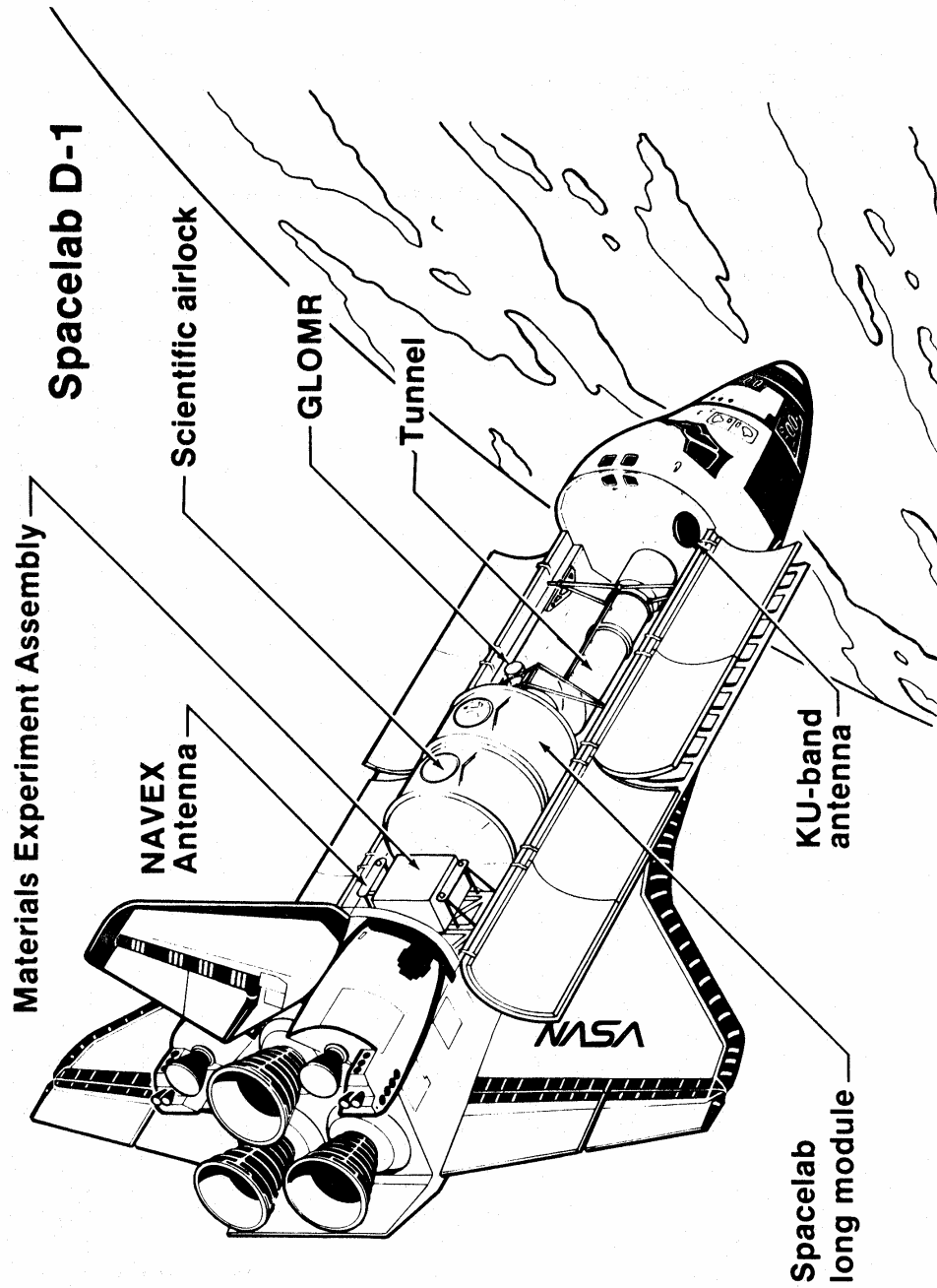
Flight Day 8

- Spacelab deactivation
- Entry and landing (nosewheel steering test)

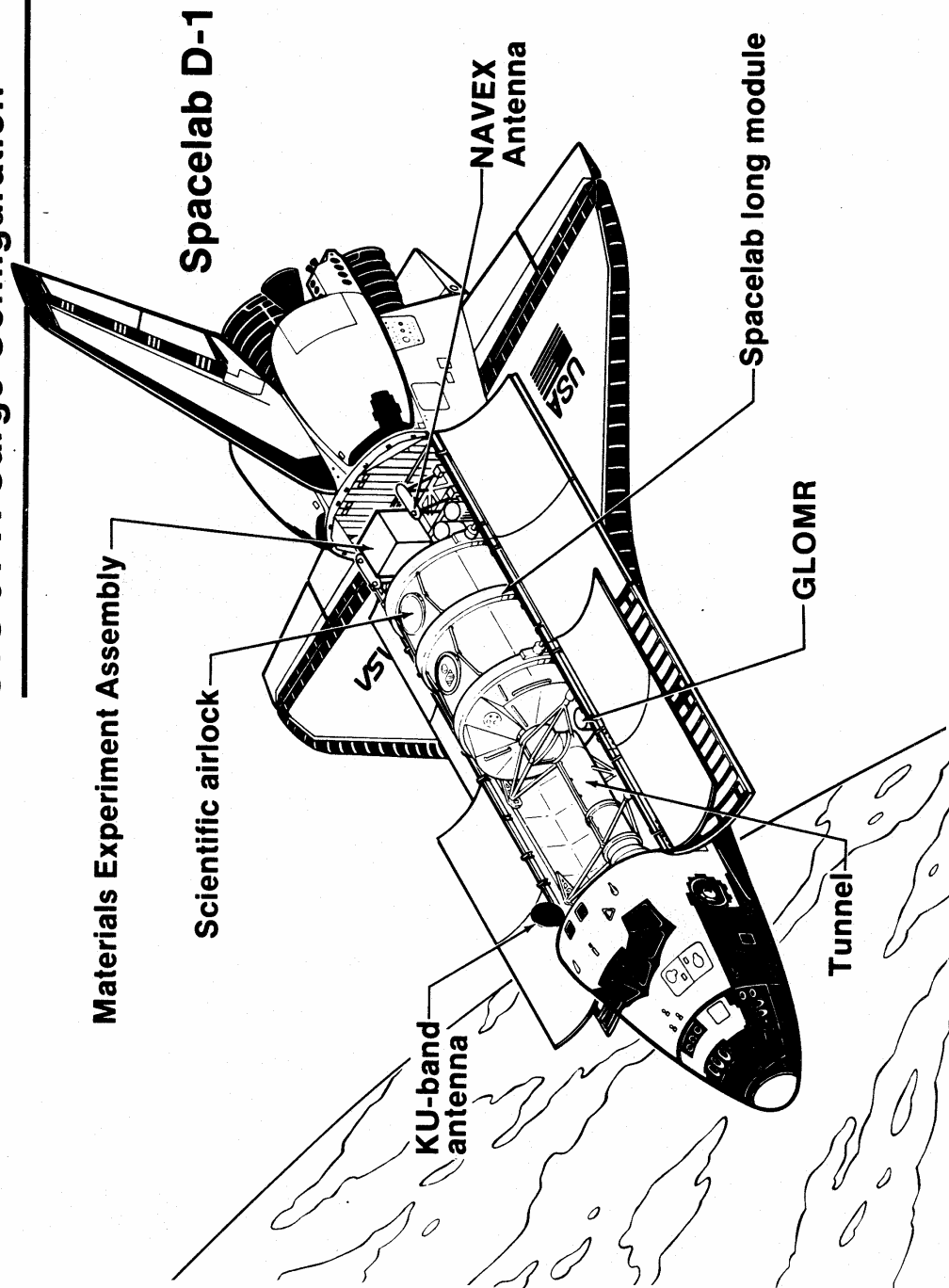


PAYLOAD ELEMENTS OPERATIONS SCHEDULE

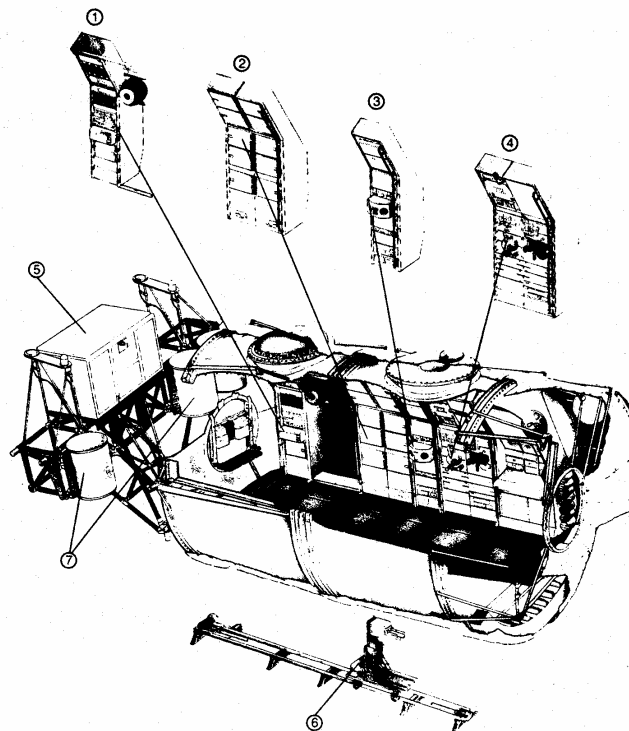
**National STS Program
STS 61-A Cargo Configuration**



**National STS Program
STS 61-A Cargo Configuration**



**SPACELAB CONFIGURATION
(Port)**



D1 payload configuration aboard SPACELAB (port side)

- | | |
|--|---|
| <p>① Vestibular rack
Control unit for sled
Control unit for ESA helmet
Control unit for NASA helmet
Rotating dome assembly</p> <p>② Stowage rack
Material rack for samples and
experiment accessories</p> <p>③ Biorack
Cooler freezer
Incubator types A and B
Glove box</p> | <p>④ MEDEA
Monoellipsoid heating facility
Gradient furnace with quenching device
High-precision thermostat</p> <p>⑤ MEA container</p> <p>⑥ Sled
Seat/rail assembly</p> <p>⑦ NAVEX
Navigation Experiment package</p> |
|--|---|

SPACELAB D-1 EXPERIMENTS

Fluid-Physics Experiments

Capillarity

Floating-Zone Hydrodynamics

Capillary Experiments

Forced Liquid Motions

Experimenter

DaRiva, Univ. Madrid, Spain

J.F. Padday, Kodak Ltd, Harrow, United Kingdom

J.P.B. Vreeburg, NLR, Amsterdam, Netherlands

Marangoni Convection

Surface-Tension Studies

Marangoni Convection

Marangoni Flows

Marangoni Convection

Convection in Nonisothermal Binary Mixtures

Bubble Transport

Diffusion Phenomena

Self- and Inter-Diffusion

Neuhaus, DVL, Cologne, W. Germany

Schwabe, Univ. Giessen, W. Germany

Napolitano, Univ. Naples, Italy

A.A.H. Drinkenburg, Univ. Groningen, Netherlands

J.C. Legros, Univ. Brussels, Belgium

A. Bewersdorff, DFVLR, Cologne, W. Germany

H. Wever/G. Froberg, TU Berlin, W. Germany

Thermal Diffusion

Inter-Diffusion

Homogeneity of Glasses

Diffusion of Liquid Zinc and Lead

Thermomigration of Cobalt in Tin

J. Dupuy, Univ. Lyons, France

J. Richter, RWTH, Aachen, W. Germany

Chr. Frischat, TU Clausthal, W. Germany

R.B. Pond, Marvalaud, Inc., USA

J.P. Praizey, CEN, Grenoble, France

Critical Point

Heat Capacity Near Critical Point

Phase Separation Near Critical Point

J. Straub, TU Munich, W. Germany

H. Klein, Cologne, W. Germany

Solidification Experiments

Solidification Front Dynamics

GETS	A. Ecker/P.R. Sahm, RWTH, Aachen, W. Germany
Aluminum/Copper Phase Boundary Diffusion	H.M. Tensi, TU Munich, W. Germany
Solidification Dynamics	S. Rex/P.R. Sahm, RWTH, Aachen, W. Germany
Dendritic Solidification of Aluminum-Copper Alloys	J.J. Favier/D. Camel, CEN, Grenoble, France
Cellular Morphology in Lead Thallium Alloys	B. Billia/J. Favier, Univ. Marseilles, France
Indium Antimonide-Nickel Antimonide Eutectics	G. Muller, Univ. Erlangen-Nuremburg, W. Germany
Containerless Melting of Glass	D.E. Day, Univ. Missouri-Rolla, USA
Solidification of Suspensions	J. Potschke, Krupp, Essen, W. Germany
Particle Behavior at Solidification Fronts	D. Langbein, Batelle-Inst., Frankfurt, W. Germany
Skin Technology	H. Springer, MAN, Munich, W. Germany
Liquid Skin Casting of Cast Iron	H. Sprenger/I.H. Nieswaag, TH Delft, Netherlands
Solidification of Eutectic Alloys	Y. Malmejac, CEN, Grenoble, France
Solidification of Composite Materials	A. Deruyttere, Univ. Leuven, Belgium

Single Crystal Growth

Silicon-Crystal Growth by Floating Zone Technique	R. Nitsche, Univ. Freiburg, W. Germany
Melting of Silicon Sphere	H. Kolker, Wacker-Chemie, Munich, W. Germany
Doped Indium Antimonide and Gallium Indium Antimonide	C. Potard, CEN, Grenoble, France
Traveling Heater Method (GaSb)	K.W. Benz, Univ. Stuttgart, W. Germany
Traveling Heater Method (CdTe)	R. Nitsche, Univ. Freiburg, W. Germany
Traveling Heater Method (InP)	K.W. Benz, Univ. Stuttgart, W. Germany
Traveling Heater Method (PbSnTe)	M. Harr, Battelle-Inst., Frankfurt, W. Germany
Vapor Growth of Cadmium Telluride	R. Nitsche, Univ. Freiburg, W. Germany
Ge/GeI ₄ Chemical Growth _h	J.C. Launay, Univ. Bordeaux, France
Ge-I ₂ Vapor Phase	J.C. Launay, Univ. Bordeaux, France
Vapor Growth of Alloy-Type Crystal	H. Wiedemeir, Rens. Poly., Troy, NY, USA
Semiconductor Materials	R.K. Crouch, NASA/Langley Research Center, USA
Protein Crystals	W. Littke, Univ. Freiburg, W. Germany

Composites

Separation of Immiscible Alloys

H. Ahlborn, Univ. Hamburg, W. Germany

Separation of Immiscible Liquids

D. Langbein, Batelle-Inst., Frankfurt, W. Germany

Separation of Fluid Phases

R. Naehle, DFVLR, Cologne, W. Germany

Liquid Phase Miscibility Gap Materials

H.S. Gelles, Columbus, OH, USA

Ostwald Ripening

H. Fischmeister, MPI, Stuttgart, W. Germany

Cell Functions

Human Lymphocyte Activation

A. Cogoli, ETH, Zurich, Switzerland

Cell Proliferation

H. Planel, Univ. Toulouse, France

Mammalian Cell Polarization

M. Bouteille, Univ. Paris, France

Circadian Rhythm

D. Mergenhagen, Univ. Hamburg, W. Germany

Antibacterial Activity

R. Tixador, Univ. Toulouse, France

Growth and Differentiation of Bacil. Subt.

H.D. Mennigmann, Univ. Frankfurt, W. Germany

Effect of μg on Interaction Between Cells

O. Cifferi, Univ. Pavia, Italy

Cell Cycle and Protoplasmic Streaming

V. Sobick, DFVLR, Cologne, W. Germany

Dosimetric Mapping Inside Biorack

H. Bucker, DFVLR, Cologne, W. Germany

Developmental Processes

Frog Statoliths

J. Neubert, DFVLR, Cologne, W. Germany

Dorso-ventral Axis

G. Ubbels, Univ. Utrecht, Netherlands

Distribution of Cytoplasmic Determ.

R. Marco, Univ. Madrid, Spain

Embryogenesis and Organogenesis

H. Bucker, DFVLR, Cologne, W. Germany

Gravi-Perception of Plants

Gravi-Perception

D. Volkmann, Univ. Bonn, W. Germany

Geotropism

J. Gross, Univ. Tubingen, W. Germany

Differentiation of Plant Cells

R.R. Theimer, Univ. Munich, W. Germany

Statocyte Polarity and Geotropic Response

G. Perbal, Univ. Paris, France

Medical Experiments

Graviperception of Man

Vestibular Research	R. v. Baumgarten, Univ. Mainz, W. Germany
Vestibular Research	L. Young, MIT, Cambridge, MA, USA

Adaptation Processes

Central Venous Pressure	K. Kirsch, Free Univ. Berlin, W. Germany
Tonometer	J. Draeger, Univ. Hamburg, W. Germany
Body Impedance Measurement	F. Baisch, DFVLR, Cologne, W. Germany

Space-Time Interaction Experiments

Navigation	
Clock Synchronization	S. Starker, DFVLR, Oberpfaffenhofen, W. Germany
One-Way Determination of Distance	D. Rother, SEL, Stuttgart, W. Germany
Psychological Behavior in Microgravity Mass Discrimination	H.E. Ross, Univ. Stirling, United Kingdom
Spatial Description in Space	A.D. Friederici/J.M. Levelt, MPI/Univ. Nijmegen
Gesture and Speech in Microgravity	A.D. Friederici/J.M. Levelt, MPI/Univ. Nijmegen
Determination of Reaction Time	H. Hoschek/J. Hund

MISSION SUPPORT

The Spacelab D-1 payload operations support team is located in the payload operations center at the German Space Operations Center (GSOC) at the DFVLR, Oberpfaffenhofen, near Munich. The team is headed by the Payload Operations Director (POD), who reports to the Mission Manager. The support team will work in shifts complementary to those of the flight crew.

The mission control room at the GSOC will accommodate the operations cadre team. This includes the POD, the Payload Activity Planner (PAP), the Science Coordinator, the Crew Interface Coordinator (CIC) and the Data Management Coordinator (DMC), as well as their assistants. Consoles with voice stations are provided with access to video screens.

A computer interface with graphics and terminals to assist the Mission Planning and Scheduling System (MPSS) with timeline replanning is available for the replanning team located in the Mission Planning Room (MPR). The software includes an orbit generation program, an event generation program (to calculate contact times, for example), and editing program (to consolidate all experiment requirements), an pre-processor for checking, a scheduler to do the timeline and an output/statistics production program. All results can be hard-copied. The MPSS will be used for pre-mission timeline preparation.

For experiment support, a User Room (UR) with consoles and voice station, as well as a User Support Room (USR), will be available. Display capability with printout to monitor experiment data is provided in the UR and USR, where the experimenters will be located. During experiment operation real-time video and voice capability will be provided.

The Mission Management Room (MMR) will accommodate the Mission Manager, Mission Assurance and Safety Manager and the Crew Surgeon.

An information room, equipped with necessary support facilities for the press and other media representatives, is available for public affairs activities.

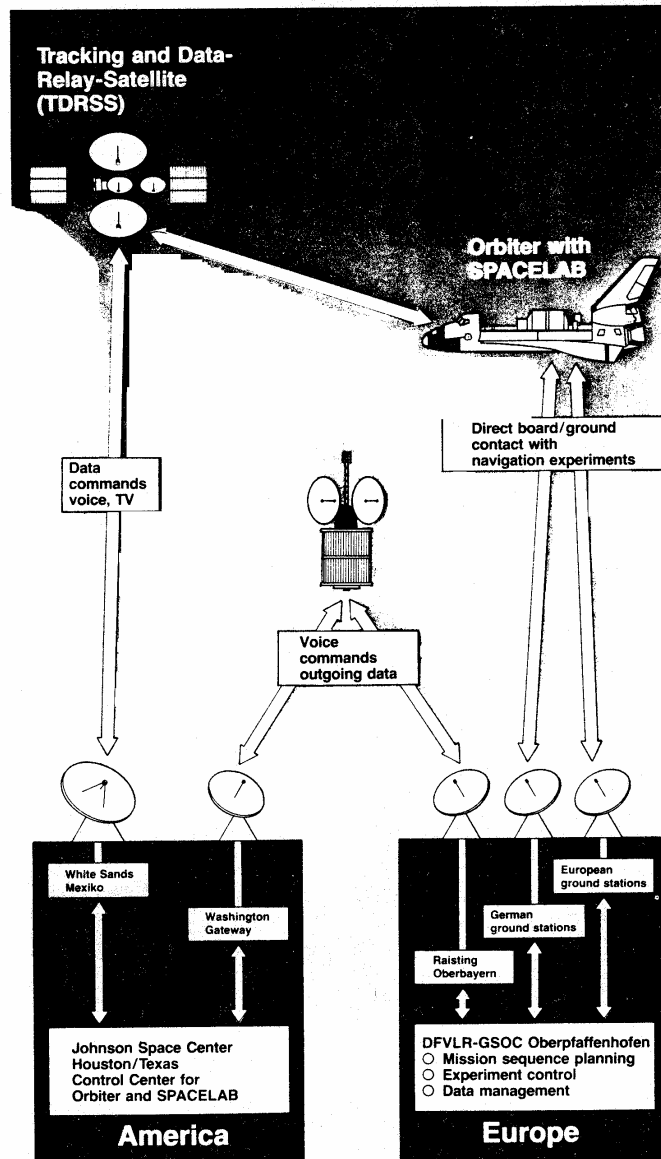
Accommodation for payload operations support network control, ground systems and communication control is established in the Network Operations Control Room (NOCR) and includes all monitoring facilities.

In addition to the UR and the USR at GSOC, remote user rooms are located at NASA/JSC for European and NASA vestibular experiments and at NASA/KSC for biological experiments. These experiments call for baseline data collection on the crew shortly before and after the flight which requires special ground support equipment. Real-time high data rates to the ground are required, as well as early access to Spacelab due to the short life-span of biological specimens.

SPACELAB D-1 MANAGEMENT

Mission Manager	Hans-Ulrich Steimle, DFVLR
Operations Manager	Hans-Joachim Panitz, DFVLR
Mission Scientist	Prof. Peter R. Sahm, Institute of Technology, Aachen

OPERATIONS CONCEPT



GETAWAY SPECIAL PAYLOAD

Global Low Orbiting Message Relay Satellite (GLOMR)

The Global Low Orbiting Message Relay Satellite (GLOMR) is carried in a standard Getaway Special (GAS) container mounted on the port side of the orbiter payload bay in the vicinity of the Spacelab Tunnel. It will be ejected via a standard Autonomous Payload Controller located in the orbiter aft flight deck. Upon receiving the proper command, a Full Diameter Motorized Door Assembly on the GAS canister opens and a spring-loaded device pushes the satellite from the container at a rate of 3-1/2 feet per second.

The GLOMR satellite is a data-relay, communications spacecraft and is expected to remain in orbit for approximately 1 year. The purpose of the 150-pound, 62-sided polyhedron satellite is to demonstrate the ability to read signals and command oceanographic sensors, locate oceanographic and other ground sensors, and relay data from them to customers. GLOMR was designed and built by Defense Systems, Inc., McLean, VA.

This will be the second attempt to deploy GLOMR. It was carried on mission 51-B in April 1985 but was not deployed due to problems with the battery supply.

NOSEWHEEL STEERING TEST

A computerized nosewheel steering system will be tested during the flight of 61-A after Challenger lands and while it rolls to a stop at the Edwards Air Force Base lakebed.

The test is one of a series to develop nosewheel steering for all Shuttle orbiters. Currently, right and left wheel brakes are applied to steer an orbiter during landing rollout, sometimes causing excess brake and tire wear.

After Challenger's nosewheel touches the ground, Commander Hartsfield can depress the right or left rudder pedal, signaling the computer to direct a hydraulic actuator to turn the nosewheel and steer the spacecraft onto the center line.

When Challenger slows to about 115 mph, Hartsfield will steer the vehicle off the center line about 20 or 30 feet. And then back onto the centerline before Challenger comes to a complete halt.

The activity to perfect nosewheel steering was initiated after the flight of 51-D last April when brakes locked and an inboard tire blew out on the right main landing gear during rollout.

The landing of mission 51-D on Kennedy Space Center's runway during crosswinds and gusts of 8 to 12 knots required heavy braking to hold the centerline during rollout, contributing to the brake damage and blowout.

61-A PAYLOAD AND VEHICLE WEIGHTS SUMMARY

	<u>Pounds</u>
Orbiter (without propellants)	176,791
Total Spacelab Payload	30,541
GLOMR and GAS Canister	590
GLOMR (deployed)	150
Orbiter at SRB ignition	213,070
Total Vehicle at SRB ignition	4,504,741
Landing Weight	213,000

STS-61A CREWMEMBERS



S85-40783 – The official portrait of the STS-61A crewmembers includes, front row (l.-r.) Reinhard Furrer, payload specialist; Bonnie J. Dunbar, mission specialist and James F. Buchli, mission specialist. Back row (l.-r.) Steven R. Nagel, pilot; Guion S. Bluford Jr., mission specialist; Ernst Messerschmid, payload specialist; Wubbo Ockels, payload specialist; and Henry W. Hartsfield Jr., mission commander. They are standing before a model of the mission insignia.

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BIOGRAPHICAL DATA

HENRY W. HARTSFIELD Jr., is mission commander. Born Nov. 21, 1933, in Birmingham, AL, he retired in 1977 from the U.S. Air Force, as a colonel, with more than 22 years active service and continued his assignment as a NASA astronaut in a civilian capacity. He was pilot for STS-4, the fourth and final orbital test flight of the orbiter Columbia. On his second Shuttle flight, he was commander of the STS-41-D maiden flight of Discovery.

Hartsfield received a bachelor of science degree in physics from Auburn University in 1954. He did graduate work in physics at Duke University, and in astronautics at the Air Force Institute of Technology. He received a master of science degree in engineering science from the University of Tennessee.

Hartsfield served in the Air Force with the 53rd Tactical Fighter Squadron in Bitburg, Germany. He graduated from USAF Test Pilot School at Edwards Air Force Base, CA, and instructed there before assignment as an astronaut to the USAF Manned Orbiting Laboratory (MOL) Program, which was canceled. He has more than 6,400 hours flying time, with 5,700 in jets.

STEVEN R. NAGEL, Lt. Col., USAF, is the 61-A pilot. Born Oct. 27, 1946, in Canton, IL, he became an astronaut in 1979. His assignments include T-38 chase pilot for STS-1, mission specialist on STS-51-G, support crew and backup entry CAPCOM for STS-2; support crew and primary entry CAPCOM for STS-3.

He was an F-100 pilot with the 68th Tactical Fighter Squadron at England AFB, LA, and served one year as a T-28 instructor for the Laotian Air Force at Udorn, Thailand. He was also test pilot on various projects including the F-4 and A-7D. He has 4,900 hours flying time, 3,100 in jets.

BONNIE J. DUNBAR is a mission specialist. Born March 3, 1949, in Sunnyside, WA, she became a NASA astronaut in 1980. She has been a payload officer/flight controller at Johnson Space Center; served as guidance and navigation officer/flight controller for the Skylab reentry mission; and was payload officer for integration of several Spaced Shuttle payloads.

Dunbar received bachelor of science and master of science degrees in ceramic engineering from the University of Washington and a doctorate in biomedical engineering from the University of Houston.

She served as a systems analyst at Boeing Computer Services; participated in research on wetting behavior of liquids on solid substrates as visiting scientist at Harwell Laboratories in Oxford, England; was senior research engineer at Rockwell International; and was a member of the Krafft Ehrlicke evaluation committee on space industrialization concepts. Dunbar is a private pilot with more than 200 hours in single-engine land aircraft. She has logged more than 300 hours as a co-pilot in T-38 jets.

JAMES F. BUCHLI, Colonel, USMC, is a mission specialist. Born June 20, 1945, in Rockford, ND, he was selected as an astronaut in 1978. He flew as a mission specialist on Shuttle mission 51-C, the first Department of Defense mission.

Buchli received a bachelor of science degree in aeronautical engineering from the U.S. Naval Academy and a master of science degree in aeronautical engineering systems from the University of West Florida.

In the U.S. Marine Corps, he served in the Republic of Vietnam; with the Marine Fighter/Attack Squadron at Kaneohe Bay, Hawaii and Iwakuni, Japan; and performed additional duties at Namphone, Thailand, and Iwakuni, Japan. He has logged 3,000 hours flying time, 2,800 in jets.

BIOGRAPHICAL DATA

GUION S. BLUFORD Jr., Colonel, USAF, is a mission specialist. Born Nov. 22, 1942, in Philadelphia, he was selected as an astronaut in 1978. He was a mission specialist on STS-8, the first Shuttle night launch and landing.

Bluford received a bachelor of science in aerospace engineering from Pennsylvania State University; a master of science, with distinction, in aerospace engineering from the Air Force Institute of Technology in 1974; and doctor of philosophy in aerospace engineering with a minor in laser physics from the Air Force Institute of Technology.

Bluford flew 144 combat missions, 65 over North Vietnam. He was a staff development engineer at the Air Force Flight Dynamics Laboratory, Wright-Patterson Air Force Base, and served as deputy for advanced concepts in the aeromechanics division and as branch chief of the aerodynamics and airframe branch. He has logged more than 3,500 hours in jets, including 1,300 as a T-38 instructor pilot.

ERNST MESSERSCHMID is a payload specialist. He was born May 21, 1945, in Reutlingen, Germany.

He studied physics at the Universities of Tübingen and Bonn; received fellowships for Studienstiftung des deutschen Volkes at CERN; and received a diploma and doctor of philosophy degree in physics.

Messerschmid has done experimental and theoretical work on proton beams in accelerators and plasmas as a visiting scientist and fellow at CERN, Geneva; and was a lecturer and research associate at Freiburg University and Brookhaven National Laboratory, NY, where he invented adiabatic phase displacement acceleration. He designed beam optics for PETRAS electron storage rings at DESY (Hamburg), and conducted research on space-borne communications at the Institute of Communications Technology, Oberpfaffenhofen.

REINHARD FURRER, a payload specialist, was born Nov. 25, 1940 in Wörgl, Germany.

He studied physics at the Universities of Kiel and Berlin, and received a diploma and doctor of philosophy in physics.

Furrer has been an assistant professor of physics and a visiting scientist at the University of Chicago and Argonne National Laboratory. He has done practical research in atomic physics, solid state physics, chemical physics and photophysics and biophysics. He has taught experimental physics and supervised undergraduate and graduate students, and presented a public lecture series, "the Arthur Compton Lectures" at the University of Chicago.





WUBBO J. OCKELS is a payload specialist. He was born March 28, 1946, in Almelo, the Netherlands.

He received a doctor of Philosophy in physics and mathematics from the University of Groningen and completed a thesis on experimental work at the Nuclear Physics Accelerator Institute in Groningen.

Ockels performed experimental investigations at the Nuclear Physics Accelerator Institute in Groningen. He was selected by the European Space Agency (ESA) as one of three European payload specialists.

SHUTTLE FLIGHTS AS OF AUGUST 1985

21 TOTAL FLIGHTS OF THE SHUTTLE

			
	<div>STS-51F 07/29/85 - 08/06/85</div> <div>STS-51B 04/29/85 - 05/06/85</div>		
<div>STS-9 11/28/83 - 12/08/83</div> <div>STS-5 11/11/82 - 11/16/82</div> <div>STS-4 06/27/82 - 07/04/82</div> <div>STS-3 03/22/82 - 03/30/82</div> <div>STS-2 11/12/81 - 11/14/81</div> <div>STS-1 04/12/81 - 04/14/81</div>	<div>STS-41G 10/05/84 - 10/13/84</div> <div>STS-41C 04/06/84 - 04/13/84</div> <div>STS-41B 02/03/84 - 02/11/84</div> <div>STS-8 08/30/83 - 09/05/83</div> <div>STS-7 06/18/83 - 06/24/83</div> <div>STS-6 04/04/83 - 04/09/83</div>	<div>STS-51-I 08/27/85 - 09/03/85</div> <div>STS-51G 06/17/85 - 06/24/85</div> <div>STS-51D 04/12/85 - 04/19/85</div> <div>STS-51C 01/24/85 - 01/27/85</div> <div>STS-51A 11/08/84 - 11/16/84</div> <div>STS-41D 08/30/84 - 09/05/84</div>	<div></div> <div>STS-51J 10/03/85 - 10/07/85</div>
OV-102 Columbia (6 flights)	OV-099 Challenger (8 flights)	OV-103 Discovery (6 flights)	OV-104 Atlantis (1 flight)